

error-containing code (the data transfer here includes a state where some data are left in the buffer memory. Not only in the present aspect but also in the other aspects, it is considered that some data are left there). When the syndrome calculating means detects an error-containing code, subsequent data in the buffer memory are transferred only to the syndrome calculating means in code word units. After not only the code word from which an error-containing code has been detected but also all the code words in the sector are corrected by the syndrome calculating means, error-corrected data that include the code word from which the error-containing code has been detected up to and including a final code word are read from the buffer memory and transferred to the error detecting means.

The error detecting means executes error detection in parallel with syndrome calculation done by the syndrome calculating means until the syndrome calculating means detects an error-containing code, while storing the mid-term results of the error detecting process to the storing means in code word units. After the syndrome calculating means detects an error-containing code, the error detecting process is suspended. Then, in the error detection for the data in and after the string from which the error has been detected, the error-corrected data are transferred from the buffer memory after the error correction done by the error correcting means, and error detection is restarted at a code word following the data stored in the storing means.

Consequently, in the error detection done by the error detecting means after the error correction, data stored in the storing means are used

as code words before an error-containing code is detected. Thus, the mid-term results of an error detecting process are used. This makes it possible to start an error detecting process at an halfway point after an error is detected and corrected, thereby greatly reducing the time required for error correction. As a result, the error correction device can cope with probable higher-speed data reading in the future.

Besides, the bus control means may perform various adjustments in order to write the error-corrected data to the buffer memory. When an error correcting process is not completed in one time, the system control means may execute error detection and error correction repeatedly in the horizontal direction and the vertical direction alternately, or data reading from a laser disk or the like may be done again by varying the reading speed. Components provided to realize these functions are well known and their description is omitted.

In the aspect 2, data reading from and writing to the buffer memory, and data transfer are done as DMA transfer. This greatly improves processing speed.

With recent high-density and high-performing ICs and CPUs, the provision of the system control unit facilitates the process and control of each unit, as compared with the process by mere circuits and connecting lines.

The aspect 3 relates to an error correction device comprising: a buffer memory for storing at least one sector of data having a structure where each of N strings of error correcting code comprises a data unit, an inner code parity unit, and one error detecting code; a syndrome calculating

means for generating syndrome as an equation for error correction for data read from the buffer memory; an error correcting means for correcting error-containing data in the buffer memory by detecting an error position from the syndrome generated by the syndrome calculating means and by
 5 calculating an error value; an error detecting means for performing error detection repeatedly, one sector at a time, for error-corrected data generated by the error correcting means; a bus control means for controlling data transfer between the buffer memory, the syndrome calculating means, the error correcting means, and the error detecting
 10 means; and a system control means for performing various processes for error correction in predetermined procedures a necessary number of times.

The bus control means transfers data to be corrected from the buffer memory to the syndrome calculating means and to the error detecting means concurrently in code word units until the syndrome calculating
 15 means detects an error-containing code. Only when the syndrome calculating means has detected an error-containing code, after the error correction done by the error correcting means for not only the error but also the subsequent code words, error-corrected data in a sector containing data from which an error-containing code has been detected are transferred
 20 from the buffer memory to the error detecting means.

The error detecting means executes error detection for a code word transmitted from the buffer memory, in parallel with the syndrome calculation done by the syndrome calculating means, and only when the syndrome calculating means has detected an error-correcting code,
 25 executes error detection one more time for the error-corrected data.